Center Innovation Fund: SSC CIF

Large Propellant Tank Cryo-Cooler (LPTC)

Completed Technology Project (2015 - 2016)

Project Introduction

In rocket test and launch facilities, cryogenic propellants stored in tanks boils off due to heat leakage, with the following impacts:

Ø *Waste, propellants boil off & requires replacement*

Ø *Concentrates impurities which do not boil off*

Ø *Imposes a thermal cycle on their finite service life*

Boil-off of is currently managed by purchasing more propellants; adaption of cryogenic-cooler technology will reduce heat buildup in the storage tanks thereby reducing boil-off, impurities and increasing life expectancy. In laboratory settings, cryogenic-coolers are used to minimize boil-off from dewars containing cryogens, however there is nothing available off-the-shelf that is designed for large cryogenic storage tanks located at present day launch and test facilities.

The goal of this project is the development of a design concept that adapts scalable off-the-shelf cryogenic-cooler technology required for test and launch facility cryogenic-storage tanks, while optionally powering the system with off the grid electricity or solar energy in order to eliminate propellant boil-off. The development of this technology would save money spent on rocket engine testing at test facilities and on ground operations at launch facilities for propellant purchases, operations, maintenance, and problems associated with impurities in propellant stores, therefore enabling access to space by making it less expensive.

Anticipated Benefits

This technology could make ground testing associated with development and qualification of propulsion systems and ground operations associated with launch and access to space less expensive.

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Technology Transfer Program Logo

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Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
●Exploration Capabilities	Supporting Organization	NASA Program	

Primary U.S. Work Locations
Mississippi

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Center Innovation Fund: SSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Ramona E Travis

Project Manager:

Jody L Woods

Principal Investigator:

Jody L Woods

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Images

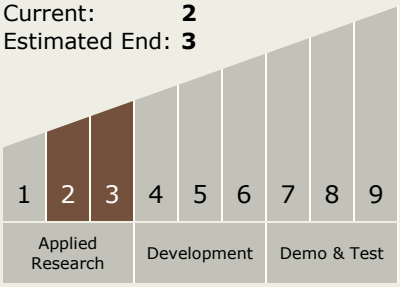
Large Propellant Tank Cryo-Cooler (LPTC)
Technology Transfer Program Logo
(https://techport.nasa.gov/image/16544)

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.2 Launch Vehicle Propellant